APPLICATION OF ERTS-1 IMAGERY IN THE VERMONT-NEW YORK DISPUTE OVER POLLUTION OF LAKE CHAMPLAIN

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Pollution Monitoring with ERTS-1

Prior to the expiration of the University of Vermont contract with NASA (June 30, 1973), three ERTS-1 images from different dates were used to document the effluent pattern emanating from the large International Paper Company Mill north of Fort Ticonderoga, N. Y. These imageries include October 10, 1972; April 7, 1973; and April 25, 1973. Documentation and discussion of the images was presented in two earlier reports and a symposium paper.[1]

Variations in the paper mill discharge pattern were observed for the three dates in question and one interpretation given for this variation was that there were contrasting rates of discharge for weekend operation producing a minimal effluent plume (April 7). Actual discharge information recently obtained do not corroborate that interpretation, so that the extent of the plume becomes a function of what waste materials are included in the effluent besides the various environmental factors that have a direct affect on the lake water such as wind and current direction and magnitude.

While the relationship between effluent composition and lake surface plume pattern is a matter for further study waiting for specific effluent data, it has nevertheless been possible to observe the pattern of water degradation on ERTS imagery and to document this pattern by mapping. A composite map showing the plume extent on each of the three dates mentioned earlier is presented in Figure 1.

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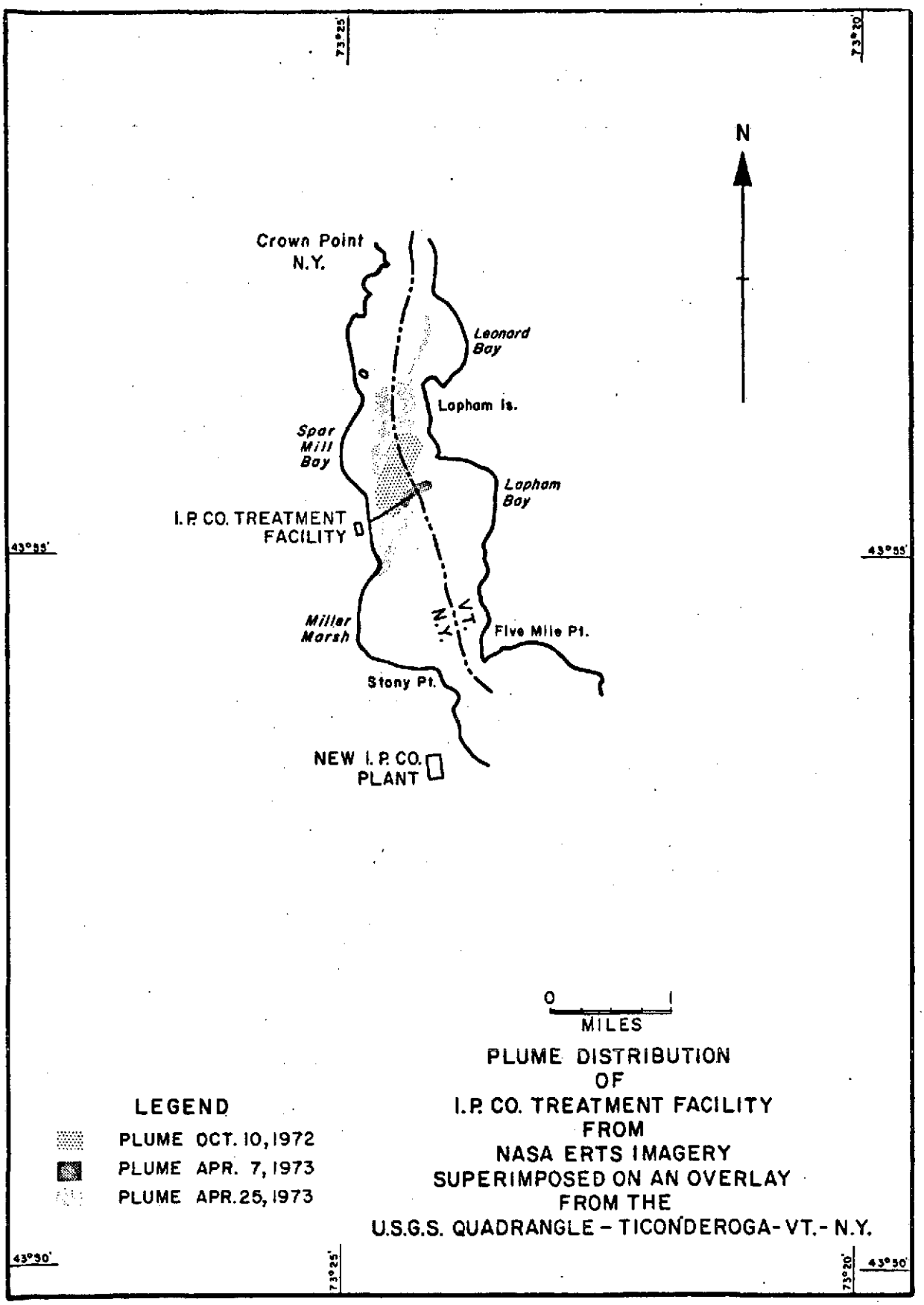
[1]Significant Result Reports:

E. B. Henson and A. O. Lind, Nov. 1972. Pollution Detection in Lake Champlain Using ERTS-1 Imagery.

A. O. Lind and E. B. Henson, June, 1973. Pollution Monitoring in Lake Champlain Using ERTS-1 Imagery.

NASA Symposium Paper:

A. O. Lind, E. B. Henson, and J. Pelton, 1973. Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont.


73°25'
73°20'
N
Crown Point
N.Y.
Leonard
Bay
Lapham Is.
Spar
Mill
Bay
Lapham
Bay
I.P. CO. TREATMENT
FACILITY
43°35'
43°35'
Miller
Marsh
Five Mile Pt.
Stony Pt.
NEW I.P. CO.
PLANT
0
1
MILES
LEGEND
PLUME OCT. 10, 1972
PLUME APR. 7, 1973
PLUME APR. 25, 1973
PLUME DISTRIBUTION
OF
I.P. CO. TREATMENT FACILITY
FROM
NASA ERTS IMAGERY
SUPERIMPOSED ON AN OVERLAY
FROM THE
U.S.G.S. QUADRANGLE – TICONDEROGA-VT.-N.Y.
43°30'
73°25'
73°20'
43°30'

The Pollution Problem

The State of Vermont is currently suing both the International Paper Company and the State of New York for degrading the waters of Lake Champlain in Vermont. The state's suit is being presented before special U.S. Supreme Court Master Ammi Cutter and has so far generated some 14,000 pages of court transcript. This particular case would seem to rank among the precedent setting variety since other states who now have or develop similar problems may find it desirable to resolve their problems through court action if other means fail.

The Attorney General of Vermont has expressed interest in the ERTS-1 imagery showing the extent of the International Paper Co. plume in the southern portion of Lake Champlain since it reveals that the degraded water pattern extends toward Vermont. The composite map (Figure 1) was prepared by superimposing enlarged ERTS imagery of the appropriate dates onto a U.S.G.S. topographic map (Fort Ticonderoga, N. Y. quadrangle, 1:62,500) showing the state boundary. Figure 1 shows the three paper mill effluent plumes extending beyond the state boundary into Vermont waters.

Application of ERTS Imagery

The interest on the part of the Attorney General's Office was translated into action on October 4, 1973, when the ERTS imagery and the composite map shown as Figure 1 were presented before the special U.S. Supreme Court Master Ammi Cutter at a regular session of the court. Reproductions of MSS band 4 imagery which reveals the pollution pattern best were presented.

A demonstration of how the map (Figure 1) was generated was also presented using the 1:1,000,000 positive transparencies, enlarged transparencies and miltispectral viewing techniques. Vermont proposed that the map and the enlarged reproductions of ERTS imagery be entered in evidence. The special U.S. Supreme Court Master accepted the ERTS imagery and the ERTS-derived information in evidence. This marks the first time that satellite imagery and satellite-derived information have been used as evidence in a court of law.

Summary

ERTS-1 imagery and a composite map derived from ERTS-1 imagery were presented as evidence in a U.S. Supreme Court case involving the pollution of an interstate water body (Lake Champlain). A pollution problem generated by a large paper mill forms the basis of the suit (Vermont vs. International Paper Co. and State of New York) and ERTS imagery shows the effluent pattern on the lake surface as extending into Vermont during three different times.